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WSI
Weston Services, Inc.

0316000067 -- Cook
Chicago / Paxton Ave Lagoons
Superfund / Tech Report

26 July 1990

Illinois Environmental Protection Agency
Division of Land Pollution Control
Permit Section
2200 Churchill Road
Springfield, IL 62706

W.O. #1104-05-01

Attention: Mr. Steve Gobelman

Reference: Agency Contract No. BIE-9035
Paxton Avenue Lagoons Site
Chicago, Illinois - LPC #0316000067

Subject: Summary Report for Trial Burn Program for a Transportable Incineration System (TIS) at the Paxton Avenue Lagoons Site

Dear Steve:

Enclosed please find 5 copies of the subject report. Since the Appendices were larger than anticipated they will be sent to you tomorrow. Should you have any questions or comments, please do not hesitate to contact me at (215) 430-3117.

Very truly yours,

WESTON SERVICES, INC.

Andrea Hol for

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Project Manager

NPJ:ma

Enclosures

cc: John Noland
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Jeff O'Neill
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Date: 25 July 1990

SUMMARY REPORT FOR TRIAL BURN PROGRAM FOR A TRANSPORTABLE INCINERATION SYSTEM (TIS) AT THE PAXTON AVENUE LAGOONS SITE

Sections 1 through 6

Submitted to:

Illinois Environmental Protection Agency
Division of Land Pollution Control
Permit Section
2200 Churchill Road
P.O. Box 19276
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Submitted by:

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25 July 1990

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SECTION 1

SUMMARY

1.1 INTRODUCTION

Weston Services, Inc./Roy F. Weston, Inc. (WESTON) is submitting this summary test report for a transportable incineration system (TIS) to treat soils contaminated with polynuclear aromatic hydrocarbon (PAH) compounds and volatile organic compounds (VOCs). The TIS is designed to meet the Resource Conservation and Recovery Act (RCRA) incinerator performance standards specified in Chapter 40 of the Code of Federal Regulations (40 CFR), Part 264, Subpart O, and the Toxic Substances Control Act (TSCA) incinerator performance standards specified in 40 CFR 761.70(b).

The TIS technology was selected by the Illinois Environmental Protection Agency (IEPA) for remediation of two toxic and/or hazardous waste sites. The first site was the Lauder Salvage Yard located in Beardstown, Illinois. More than 8,500 tons of soil contaminated with polychlorinated biphenyls (PCBs) were successfully treated using the TIS. The second site currently being remediated is the Paxton Avenue Lagoons Site located in Chicago, Illinois (IEPA site number 0316000067).

The trial burn program for the Paxton Avenue Lagoons Site was conducted in two phases (or parts) on the following dates:

- Part A - 31 March 1990
- Part B - 5 and 6 April 1990

WESTON conducted the trial burn program and provided the analytical services.

1.2 BACKGROUND

WESTON has designed the TIS to treat soils contaminated with organic contaminants. The TIS employs a two-stage combustion process for incineration of solid wastes. The primary incineration chamber consists of a rotary kiln; the secondary combustion chamber consists of an afterburner. Flue gas exiting the afterburner is further treated by a pollution control system that removes particulate and neutralizes acidic gases. The controlled flue gas emissions are discharged to the atmosphere. The TIS is designed to accommodate over 20,000 pounds per hour (lb/hr) soil (on a wet basis).

1.3 OBJECTIVE OF THE TRIAL BURN PROGRAM

The objective of the trial burn program is to demonstrate that the TIS is capable of meeting the RCRA incinerator performance standards for soils contaminated with organic compounds.

Six tests were completed to meet the program objective, as follows:

- Part A - Three tests conducted to establish the maximum feed rate for the operating permit. The tests were completed using uncontaminated soil spiked with tetrachloroethylene (PCE).
- Part B - Three tests conducted to demonstrate the capability of the TIS to treat actual wastes spiked with PCE.

1.4 EXECUTIVE SUMMARY

A summary of the results of the six tests conducted during the trial burn program are presented in Table 1-1 (Part A) and Table 1-2 (Part B). The results indicate that the incinerator system achieved greater than 99.9947 percent destruction and removal efficiency (DRE) for the trial burn program.

Table 1-1

Summary of Results of Trial Burn Program
Part A*

Parameter	Units	Test A-1 3/31/90	Test A-2 3/31/90	Test A-3 3/31/90
Test time begin		10:15	11:45	13:35
Test time end		11:23	12:55	14:42
Operating Parameters:				
Average solid waste feed rate	lb/hr	20,310	20,310	20,310
PCE concentration in solid feed	ppm	1,620	1,620	1,620
Total chlorine in solid waste feed	ppm	1,390	1,390	1,390
Average auxiliary fuel feed rate	cfm			
- Rotary kiln		34	65	65
- Secondary combustion chamber		167	150	145
Auxiliary fuel heat release	10^6 Btu/hr			
- Rotary kiln		1.99	3.80	3.80
- Secondary combustion chamber		9.76	8.77	8.47
Average gas residence time	sec	2.22	2.24	2.22
Combustion air flow rate	acfm	7,731	7,674	7,770
Average combustion gas				
- Oxygen	% dry volume	11.4	10.9	11.0
- Carbon dioxide	% wet weight	5.44	5.70	5.49
- Carbon monoxide	ppm	1.52	1.62	1.78
- Total hydrocarbons	ppm	3.22	2.01	3.01
Average combustion efficiency	%	99.99	99.99	99.99
Scrubber quench flow rate	gpm	396	395	395
Scrubber water pH	Not applicable	8.5	8.9	9.4

Table 1-1

Summary of Results of Trial Burn Program
Part A[a]
(continued)

Parameter	Units	Test A-1 3/31/90	Test A-2 3/31/90	Test A-3 3/31/90
Destruction temperature	°F			
- Rotary kiln		1,592	1,524	1,518
- Secondary combustion chamber		1,852	1,850	1,852
Emissions:				
Total sample time	min.	60	60	60
Total sample volume	dscf	40.328	37.711	40.195
Average stack gas flow rate	dscfm	10,100	9,800	10,100
Average particulate concentration	gr/dscf			
- at 12% CO_2		0.0015	0.0054	0.0218
- at 7% O_2		0.0009	0.0033	0.0134
Average HCl mass rate	lb/hr	0.04	0.05	0.05
Average HCl removal	%	99.9	99.8	99.8
Average SO_2 mass rate	lb/hr	NA[b]	NA	NA
POHC DRE	%	99.9983	99.9998	99.9967

[a]Some values different than those included in summary submitted 9 April 1990 due to revised solid waste feed rate (downtime of 35 minutes was not previously subtracted from operational time).
[b]NA = Not applicable.

Table 1-2

Summary of Results of Trial Burn Program
Part B[a]

Parameter	Units	Test B-1 4/5/90	Test B-2 4/6/90	Test B-3 4/6/90
Test time begin		13:54	08:22	13:41
Test time end		20:21	11:46	19:07
Operating Parameters:				
Average solid waste feed rate	lb/hr	5,320	4,750	4,750
PCE concentration in solid feed	ppm	6,550	7,320	8,430
Total chlorine in solid waste feed	ppm	5,610	6,800	7,220
Average auxiliary fuel feed rate	cfm			
- Rotary kiln		8.7	8.8	8.0
- Secondary combustion chamber		29.6	6.0	22.7
Auxiliary fuel heat release	10^6 Btu/hr			
- Rotary kiln		0.51	0.51	0.47
- Secondary combustion chamber		1.73	0.35	1.33
Average gas residence time	sec	2.46	2.51	3.05
Combustion air flow rate	acfm	7,015	6,646	5,520
Average combustion gas				
- Oxygen	% dry volume	12.8	12.5	12.9
- Carbon dioxide	% wet weight	6.28	7.29	4.55
- Carbon monoxide	ppm	5.82	4.21	6.25
- Total hydrocarbons	ppm	1.67	0.64	6.26
Average combustion efficiency	%	99.98	99.99	99.96
Scrubber quench flow rate	gpm	398	399	399
Scrubber water pH	Not applicable	8.3	8.5	8.3

Table 1-2

Summary of Results of Trial Burn Program
Part B[a]
(continued)

Parameter	Units	Test B-1 4/5/90	Test B-2 4/6/90	Test B-3 4/6/90
Destruction temperature	°F			
- Rotary kiln		1,937	1,822	1,696
- Secondary combustion chamber		1,895	1,945	1,931
Emissions:				
Total sample time	min.	120	120	120
Total sample volume	dscf	65.316	70.610	75.395
Average stack gas flow rate	dscfm	7,700	7,900	8,800
Average particulate concentration	gr/dscf			
- at 12% CO_2		0.0024	0.0070	0.0068
- at 7% O_2		0.0018	0.0053	0.0048
Average HCl mass rate	lb/hr	0.07	0.15	0.12
Average HCl removal	%	99.8	99.6	99.7
Average SO_2 mass rate	lb/hr	0.65	6.89	0.37
POHC DRE	%	99.9955	99.9947	99.9988

[a]Some values different than those included in summary submitted 9 April 1990 due to revised solid waste feed rate (downtime of 35 minutes was not previously subtracted from operational time).

The transportable incineration system met and exceeded RCRA guidelines for air emissions of particulate and hydrochloric acid (HCl) while processing a maximum rate of 20,310 lb/hr. Emissions of particulate ranged from 0.0015 grains/dry standard cubic foot (gr/dscf) to 0.0070 gr/dscf (corrected to 12 percent carbon dioxide). Particulate emissions were one order of magnitude below the regulatory criteria of 0.08 gr/dscf (corrected to 12 percent carbon dioxide). Emissions of HCl ranged from 0.04 lb/hr to 0.15 lb/hr, also at least one order of magnitude below the regulatory criteria of 4 lb/hr.

The demonstration test was conducted with minor deviations to the sampling and analysis procedures provided in the Trial Burn Plan. These deviations, which are fully described in Sections 3 and 4 of this report, had no effect on the demonstration of the unit or the accuracy of this summary report.

All data presented has passed WESTON's rigorous internal quality assurance program. The full quality assurance report is presented in Section 6 of this report.

1.5 DOCUMENT ORGANIZATION

This document has been organized into the following seven sections:

Section	Title
1	Summary
2	Process Operation
3	Sampling and Monitoring Procedures
4	Analytical Procedures
5	Test Results
6	Quality Assurance Summary
7	Audit Summary

The following appendices are also included:

A	Hourly Average Data
B	Weigh Ticket Information
C	Daily Event Logs
D	Raw Analytical Data
E	Sampling Data
F	Summary of Volatile Organics Test Data
G	Summary of PCE Test Data
H	Comparison of Maximum Allowable Concentrations of Metals to Measured Concentrations
I	Results of VOST Audit